POPULATION BULLETIN

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People vs. Resources*

THE QUESTION, "Has the United States of America the material means to sustain its civilization?" would never have occurred to the men who brought this Nation into greatness as the twentieth century dawned. But with the twentieth century now half gone by, the question presses and the honest answers are not glib. . . . The plain fact seems to be that we have skimmed the cream of our resources as we now understand them; there must not be, at this decisive point in history, too long a pause before our understanding catches up with our needs.—Report of the President's Materials Policy Commission.

What kind of lives will the people of this nation live during the last quarter of this twentieth century?

So many imponderables are involved that there is no simple, clear-cut answer to that enigma. Of all the forces molding the future, the people, the land, and the resources of the land will be primary. A far greater population than now, living in a society whose economy is even more complex, will make ever increasing demands upon the resources of this nation.

It is often said that the center of gravity in world affairs has moved to the United States, thrusting upon this nation a responsibility which it cannot ignore and must accept. If that is so, the rate of drain on our resources will be greatly accelerated in the years ahead.

The ideological struggle of our time might be won or lost on the issue of helping less fortunate peoples achieve their desire for better levels of living. Today that desire is almost universal: The Orient and Middle East seethe with it.

If we are to assume that responsibility, let us do so with open eyes. To achieve higher living levels in the United States and throughout the world, the best methods known must be applied to production, utilization, distribution, and conservation everywhere. But that is not enough.

Each increase in the living levels of any population is at the expense of a substantially increased per capita consumption of materials and energy. In undeveloped countries, each increase is a step closer

*This issue, the first of a series of three, deals with renewable resources. Forthcoming issues will deal with non-renewable resources and with the qualitative aspects of population change.

to a mechanized society: industrialization.

Industrialization means dependence on science and technology. That in turn creates a demand for literate, educated citizens to carry out the functions of such a society. A much longer non-productive period for education is essential for a greater proportion of people. In the United States, the individual with least training starts to work at 16-18; in the Orient, from 6-10 years of age. Trained personnel the world over start to work at about the same time—from 20 to 35 years of age, depending upon the skill or profession for which they are trained. Furthermore, trained personnel must be supported and housed during this longer period of training, and they must be provided with equipment with which to work. This essential socio-economic extension of the period of infancy involves vast capital outlays for training, maintenance, and equipment. These combined outlays translate themselves into huge material requirements.

But industrialization is not enough. Many well-meaning people think that industrialization will solve the problem of overpopulation of countries like India because they erroneously believe that low birth rates will quickly follow. They fail to recognize that it took almost a century to achieve the low birth and death rate pattern of the western world, and they seem to forget that there were then large areas of empty land to absorb some of the rapidly multiplying people.

In "coiled" countries — where high death rates and birth rates result in high reproduction potential — there will be a time lag of at least a generation from the beginning of industrialization until the rate of natural increase is appreciably lowered. In India and Indonesia there was rapid multiplication of people before industrialization began. There is no demographic safety valve of empty lands to absorb millions while the small-family pattern of western countries is being established.

India's population of some 370 million is increasing over five million a year. If modern medicine were to be applied to large segments of the population, as it was in Japan during the Occupation, the death rate would fall rapidly but the birth rate would remain high. That would accelerate the present rate of growth. Today Ceylon is trying to cope with a population explosion set off when the death rate was cut in half almost overnight, but the birth rate remained high.[1]

Unless effective measures of population control are applied simultaneously with death control measures in "coiled" countries the rate of increase is pushed even higher.

The United States gives technical assistance to many of these countries in an effort to help increase their food production. This assistance often includes medical aid which lowers death rates, but it does not include aid to lower birth rates. Results so far indicate that increases in food production do not keep pace with the increase in the number of mouths to be fed.

Today even though India is running as fast as she possibly can in this race, she is barely standing still. Fortunately the Indian Government has become aware of the problem and is heroically striving to cope with it. Population control studies have been initiated as a part of the Five Year Plan and clinics are being opened in various parts of the country.[2] The great need remains: better control techniques which will be acceptable within the various cultures. Until they are found, the best techniques available should be applied.

In the years ahead industrial development of other nations will intensify pressure on our own and on world resources. The industrialization of the United States serves to illustrate this.

HOW AN INDUSTRIAL GIANT GREW

The interrelation between the earth and those who live on it and use its resources is called "ecology." Ecological balance of a nation depends upon forests and grazing lands as well as upon land, agricultural production, water, fuel, and mineral wealth.

Resources-spendthrift psychology is deeply ingrained in our national consciousness. The nation's ecological balance did not even enter into the minds of our people during the past three centuries of growth and expansion. The pioneers who opened this vast, rich continent pushed the wilderness back by cutting and burning virgin forests to open up farm lands. When soil wore out from overuse, farms were abandoned for new lands. Minerals were taken out of the earth with no thought of the future. Wealth "unlimited"—so they thought—had been tapped. The network of a vast transportation system was laid down to haul that wealth east, west, north and south. In the historical time span a new nation was transformed into an industrial giant almost overnight.

It has often been said that wasteful, reckless use and exploitation of our natural resources helped to speed up the development of the nation. Whether or not that is so, and what the ultimate price proves to be, spendthrift utilization did nothing to create a resources reserve for the future, nor a psychology favorable to conservation. Today some of the resources which helped to make this nation great are seriously depleted while other more plentiful resources must carry an added strain to satisfy the ever increasing demands of our increasingly complex society.

Modern pioneers work in laboratories, searching for substitutes for raw materials which have been exhausted or are in dwindling supply. They are making fabrics of glass, of coal and limestone. They are producing substances which change the composition of the soil hoping for miracles which will double and redouble food production. They are finding still newer wonder drugs to make people live longer.

The many wonders of technology have greatly changed the way of life of this nation in the past fifty

years. Many changes are in prospect in the years ahead. But technology, too, has its base in the people, the land, and the resources of the land. It has gone forward by greatly increasing the rate of depletion of the raw materials which make it tick. During the great technological boom since 1900, the United States has passed from a nation almost entirely self-sufficient in resources to one of growing dependence upon other largely undeveloped nations for many essential raw materials. Technology can continue to tick only as long as raw materials are available.

This change in the nation's circumstances has taken place during a period of awakening to the need for conservation. So much progress has been made since Theodore Roosevelt and Gifford Pinchot made conservation a national issue that we are prone to think that effective conservation of natural resources has been achieved, and that the conservation ethic has become the ideal of this nation. But has it really?

Of the 461 millions of acres of commercial forest land, only about 23 percent is in good practice. Of the 1,159 millions of acres of farm land, only about 23 percent is under soil conservation practice.[3] The United States, once the world's largest exporter of petroleum products, imported about a half a billion barrels of oil in 1950 to meet domestic needs. Oil drilling practices are less wasteful than they were 25 years ago, but our rate of consumption has tripled and continues to go up.[4] Today no one knows whether the yet untapped reserves are sufficient to see this nation through another century.

Ecological balance between the land and its resources and the number of people which they must support must be in the years to come the base for the nation's future planning. The year 1975 is not as distant in the future as the beginning of the depression (1929) is in the past—the year 2000 is no further distant than is the beginning of the conservation movement in the past. To understand what is ahead it is essential to look back to see how our population growth has increased the pressure on our resources.

HOW OUR PEOPLE MULTIPLIED

From an infinitesimal base of approximately 2.5 thousand people of European origin in this country in 1620, the colonies grew to about 52 thousand people in 1650. This 21-fold increase was due mainly to immigration. After the first few years, natural increase became and has since remained the main source of population growth.

During the next century of pioneering when farms were carved out of a wilderness, the population increased 23 fold, to a total of 1.2 million. During the succeeding century, 1750-1850, when expansion pushed to the Pacific Coast, numbers again had increased 19-fold, to 23.2 million. The century of industrialization, exploitation, and three major wars (1850-1950) ended with some 153 million people: a six-fold increase.[5]

The last doubling of numbers in

the United States took 50 years; in the world 70 years. The United States is still multiplying at a more rapid rate than the world. During the decade 1930-1940 the rate of increase slowed down but since then it has accelerated appreciably. The world rate of increase has also been speeding up. The following table shows the percentage gain in numbers in the United States since 1920 by five-year periods:

Interval	Percent Increase
1920-24	7.2%
1925-29	5.1%
1930-34	2.7%
1935-39	2.9%
1940-44	4.8%
1945-49	6.6%
1950-54	6.3%[6]

The current rate of increase of 1.5 percent a year is as rapid as the increase in the second decade of the twentieth century.

WHERE DO WE GROW FROM HERE?

The speed-up in population growth which began in the late 1930's was to be expected after the extremely low birth rates of the early depression years. Few demographers believe that the current high rate of increase prevalent since the war will continue. Exactly what is going to happen, even as soon as 1975, is not clear. The birth rate is highly responsive to economic conditions in the United States, so marked shifts in fertility could take place before that time.

That is why forecasts of population growth are always a gamble. Shifts in the birth rate in the years ahead might greatly alter the rate of natural increase. With effective control of epidemic diseases and famines, the death rate is virtually stabilized in industrialized countries. Therefore, accurate predictions dealing with people already born, such as age grouping and sex composition, are possible.

Because of the marked increases in the birth rate beginning in the late 1930's most of the predictions[7] of United States population made 25 years ago look foolish today. One exception is the projection to 1950 made in 1925 by Dr. Raymond Pearl of Johns Hopkins University.[8] Dr. Pearl based his projection on a complicated mathematical formula called the "logistic curve." Fitting this formula to United States population growth from 1790 to 1920, he projected population totals to 2100. His 1950 estimate (149 million) was remarkably close. His estimate for 1975 is approximately 173 million, for 2100 some 197 million.

More recently two government statisticians estimated the 1975 population on the basis of various assumptions regarding fertility, mortality, and migration. They came up with three possibilities: "low" 165.6 million, "medium" 190.1 million, and "high" 225.3 million.[9]

Two special commissions have recently hazarded guesses of total numbers in this country in 1975. In 1950, the Water Resources Policy Commission used an estimate of 190 million. Two years later the Materials Policy Commission used an estimate of 193 million.[10]

The chart illustrates the growth curve of population since 1900 and the 1975 projections, discussed

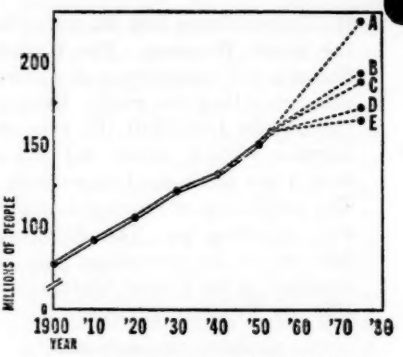
above, which range from 166 million to 225 million people.

The trend of population growth during the last five years strongly suggests that the low estimate of 165.6 million will widely miss the mark since numbers total almost 160 million today and annual increase is touching three million. There seems to be no indication that the small-family pattern is changing in this country or that the proportion of three-child and four-child families is increasing. Unless this happens, some decline in current rates of increase is expected. The large cohorts of youngsters and adolescents born during the birth-boom which began in 1938 will begin to reach marriageable age about 1960. This could give another spurt to the rate of increase if economic conditions remain favorable. A major depression would undoubtedly slow down the rate of increase considerably.

The best guess seems to be that by 1975 the United States population will be near the Hagood-Siegel "medium" estimate of approximately 190 million. Over 30 million more people than there are today will be sharing the nation's bounty. By the year 2000, the population could reach 200 million.

RISING DEMAND: DWINDLING RESOURCES

Whatever the population of this nation will be by 1975—whether 190 million or 225 million—the total will be so great that maintaining and improving the present standard of living will present innumerable problems and increase,



U. S. POPULATION GROWTH 1900-1975

The five projections to 1975 are from the following sources: *A*—Hagood-Siegel "high"; *B*—Materials Policy Commission; *C*—Water Resources Policy Commission, (Hagood-Siegel "medium"); *D*—Raymond Pearl; *E*—Hagood-Siegel "low."

rather than reduce, the pressure on resources.

As industrialization spreads to other nations, pressure on our own and on world resources will be intensified. So complex is the problem that this publication cannot begin to give more than a cursory discussion, with references of sources for further study.

Two presidential commissions have surveyed the nation's resources in recent years, projecting the demands of our rapidly growing population into the future. The reports of these commissions deal with the basic essentials of our industrialized economy, and the general conclusions reached are much the same, with variation in emphasis. The unpleasant truth is that our vaunted industrialized civilization is living on the capital of the planet.

The report of the Materials Policy Commission, recognizing the

part this nation is taking in world leadership, discusses the accelerated rate of consumption of natural resources in these words:

The United States appetite for materials is Gargantuan—and so far, insatiable. At mid-century, over 2½ billion tons of materials are being used up each year to keep the country going and support its high standard of living. With a population of 151 million, each person uses up, on an average, some 18 tons a year. He uses about 14,000 pounds of fuel for heat and energy — warming houses and offices, running automobiles and Diesel trains, firing factory boilers, and hundreds of other tasks. He uses 10,000 pounds of building materials—lumber, stone, sand and gravel, etc.—plus 800 pounds of metals winnowed from 5,000 pounds of ores. He eats nearly 1,600 pounds of food; this together with cotton and other fibers for clothing, pulpwood for paper and other miscellaneous products mounts up to 5,700 pounds of agricultural materials. In addition, he uses 800 pounds of nonmetallics, such as lime, fertilizer, and chemical raw materials.

Such a level of consumption, climaxing 50 years of phenomenal economic progress, has levied a severe drain upon the United States endowment of natural resources. Minerals, forest, soil, and water—all have felt it. A few comparisons between 1950 and 1900 are instructive. In the first 50 years of the twentieth century, United States population doubled. National output in this same time reached five times the 1900 level. The per capita national income for Americans rose from roughly $325 in 1900, to $530 in 1925 and $864 in 1950 (in 1939 dollars). . . . Our total consumption of agricultural products of all sorts, including food, increased 2¼ times; fishery and wildlife products rose little more, and our total use of forest products actually declined 1 percent. But our consumption of minerals, including fuels, rose to six times 1900 totals.

* * *

But "renewable" resources have also felt the strain. Ninety percent of our virgin timber stand in the commercial forest area has been cut, and thus far we have done a poor job of growing replacement crops. At present we are using up our inventory of saw-timber at a rate 40 percent faster than its annual growth rate. Millions of acres have been taken out of forest growth; other millions have gone to brush and inferior trees. Upon our agricultural land we have imposed a heavy burden of depletion; we have opened it, exploited it heavily, abandoned much of it after its fertility had been drained, and moved on to repeat the process elsewhere. Partly because of soil erosion, even water, once regarded as a "free commodity" of virtually unlimited supply, has become a problem in areas where once it was plentiful. . . . The time has clearly passed when we can afford the luxury of viewing our resources as unlimited and hence taking them for granted. In the United States the supplies of the evident, the cheap, and the accessible (chemically and geologically) are running out. *The plain fact seems to be that we have skimmed the cream of our resources as we now understand them; there must not be, at this decisive point in history, too long a pause before our understanding catches up with our needs.*[11] (Editor's note: Italics are ours.)

THE OUTLOOK FOR WATER

Water, soil, grazing land, and forests — America's basic renewable resources — are so closely interrelated that one cannot talk about any of them as isolated entities. As the world's most powerful industrial nation we require vast quantities of good quality water. Whether this continues to be available is inextricably wrapped up in how our farms are tilled and how adequately the ground cover of our forests and grasslands is maintained.

Until a century ago primaeval forests maintained the ground water reserves of the United States at

a high level. The organic layer of topsoil, leaf mold, and grass afforded a porous structure which held rain water long enough for it to sink into the earth. Destroying the forests and denuding large areas of land increased the run-off and decreased the soak-in over large areas.

When Daniel Boone explored western Kentucky, a squirrel could travel from the Atlantic seaboard to the Mississippi River from one tree to another without ever touching the ground. To the pioneers the forest was an enemy to be destroyed. As the pioneers moved west, cutting and burning the forest to open land for farming and settlements, a time soon arrived when a Mississippi-bound squirrel had to do a good deal of walking. The pioneer attitude toward forests persists today, as witness what happens when a bulldozer moves into a forested area to open up a subdivision. Even though wood and pulpwood is in scarce supply it is still wasted in vast quantities in this country.

A person working in a factory in Oklahoma City or Denver would never think that the permanence of his job is related to the way our national forests and grazing lands are utilized. But in the ecological balance of the nation the link is clearly defined.

If the forests should be pushed back to open up grazing lands, or if the millions of acres of grass lands now administered by the government should be more heavily grazed than they are now or subjected to indiscriminate exploitation in other ways, precious ground water reserves could be so reduced over the years that industrial plants of the great plains and the far west would be literally high and dry. Farther west, rivers have been carried over mountains—at a price —to furnish water to arid cities. But what will happen should these rivers go dry?

Nobody knows exactly how much water industry, agriculture, and the 159 million American people consume each day. Estimates range from 10 billion to 200 billion gallons. Some 4.3 trillion gallons of water fall as rain each day on this vast country. About 3 trillion gallons immediately evaporate into the atmosphere to come again as rain another day. The remaining 1.3 trillion gallons would furnish the average flow for about 3 Mississippi rivers.[12] This is still more than enough water for everybody. But if these trillion gallons of rain were to run unchecked down the hills into the streams and rivers, the land would be quickly gutted, floods would take over the rivers, and river bottoms would be buried in silt. Surface water sources would be rendered unfit for use and the ground water reservoir would shrink. Water—muddy water—everywhere, but not a drop fit to drink!

The capacity of our ground-water reservoir is enormous. The greatest reserve of surface water is the Great Lakes. They contain about 2½ years of total rainfall (less evaporation) of the entire nation.[13] Yet before extensive pumping began the ground reserve contained more water than the Great

Lakes. Because of the nature of rock formation, this reserve is not distributed evenly throughout the United States nor does it shift readily from one area to another.

Today the ground water reserve of large areas is beginning to be depleted. With thousands of square miles of forests and their leaf-mold carpets gone, with topsoil thinner than it was, and with the quality of the grass-cover deteriorating by continued over-grazing, run-off creates flash floods which rip top soil from ploughed land and silt up the streams and rivers.

In certain parts of the United States the "mining" of ground water has reached the danger point. In the high plains region of southern Texas water is being drawn at twenty times the rate of replacement.[14] Depletion of ground water has jeopardized the operation of industrial plants in the Ohio valley and elsewhere. It is resulting in the seeping of sea water into wells on Long Island and other places along the Atlantic seaboard.[15] As exploitation becomes more intense, another "inexhaustible" resource begins to fade.

The Water Commission blames mismanagement including excessive extraction and careless contamination for the ground water problem. The Commission believes that much of the mismanagement is "from a failure to foresee results of uncontrolled development." With that the Geological Survey concurs:

> Without proper management we can look forward to nothing more than aggravation of existing problems and creation of new ones. With it we can modify the natural regime to make the ground water reservoirs take in more water and waste less; we can utilize their storage function more effectively to reduce wasteful and destructive flood runoff in the wet season and in periods of wet years and make more water available in the dry season and in periods of dry years, when it is needed most; in short we can make ground water assume its rightful place in our economy, a place it must occupy if we are to continue to grow in strength and well-being.[16]

LAND IN TERMS OF AGRICULTURAL PRODUCTION

Land is too often considered an inanimate thing. Healthy, fertile soil is actually alive. When soil wears thin from over-use, a nation's domestic food and water supplies are threatened. There are many examples in the world today which illustrate how intense population pressure upsets the ecological balance of a nation so that it is no longer able to grow enough food for its own people: Greece, Italy, Spain, to mention only a few.[17] The dust bowl days of the early thirties in this country still haunt the memories of those who lived through them.

The food production potentials of the world at large—or of any single nation—are subjects which have stimulated much disagreement. For several years two opposing schools of thought have argued the point. One group holds that the wonders of technology can produce — if forced to do so — miracles equaling that of the loaves and the fishes to feed untold numbers. Another group believes that the trend of postwar years portends the trend of the future: that world population increase will continue to out-

strip the increase in food production.[18]

The technological revolution which began with the turn of the century in this country matured more slowly on the farm than in industry. The greatest changes have come during the past 15 and 20 years.

In 1900 the farm was an almost self-sustained unit, providing its own source of power, fertilizer, fuel, and food. The U. S. Department of Agriculture reports that today farms require some seven million tons of finished steel, 50 million tons of chemical materials (five times the amount needed in 1935), 16½ billion gallons of crude petroleum, 320 million pounds of raw rubber, and 15 billion kilowatt hours of electrical power.[19]

In 1900, about 35 percent of the total population lived on farms and one-third of the total labor force was directly engaged in agriculture.[20] Today only 15 percent live on farms and less than one-sixth of the total population is employed in agriculture: some 10 million are working on farms, 6 million are producing for and servicing farms, and 9 million are processing and distributing farm products.[21]

According to the Department of Agriculture, the United States farmer is producing more today with 20% fewer man-hours of labor and 11% more harvested acres than he was in 1910: "Farmers have succeeded in supplying *more food to a greater number* with fewer man-hours of work, and with only a slight increase in the area of productive land."[22]

When all those who participate in industries essential to agricultural production are taken into account, such statements lose some of their meaning. In addition to the 15 million engaged in producing for and servicing farms or processing and distributing farm products, a host of workers actually devote part of their time to agriculture. To mention only a few: crews of ore-boats on the Great Lakes, geologists exploring for oil, executives and clerks of General Motors and American Telephone and Telegraph Co. Viewed in this light, the production of food remains one of man's most time consuming activities.

Changes in the nation's diet, especially since 1930, have greatly affected agricultural production. The trend has been away from grain products and potatoes toward greater consumption of animal products and fruits and vegetables.[23] Yet there are large numbers in the population whose diets are still deficient, due either to habit, to inadequate income, or to lack of knowledge about nutrition. But generally, the trend has been toward improvement.

These changes in diet will be reflected in crop requirements for the future. They demand higher per capita land use. When crops go into livestock production rather than directly into human consumption, the calorie production per acre is decreased even though other nutritive factors are increased.

The shift to more livestock products in the diet since 1942 has increased the land requirements 0.14

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*TYPICAL INQUIRIES . . .

"I am interested in securing a study or report on population growth and shifts in towns and communities throughout America. I have been referred to you by the National Association of Manufacturers, who tell me that you put out a report of this kind eight times a year. Any and all information you can give me on this subject will be greatly appreciated." New York.

"It is my responsibility to plan the conference on population to be held on this campus. While the general data is population we would like to put some major stress on the relation between the main theme and public school education . . . [could you recommend] some speakers who might be interested in presenting papers on this topic?" Indiana.

"In a forthcoming article on Guatemala City, we have a reference to the average family there as being 4.82 persons, 'above the world norm.' The question is whether that statement is correct. Thanks for any information you can give us." Pennsylvania.

"A graduate student at Syracuse University, I am undertaking a research project dealing with the economy of Puerto Rico. The population aspects bear, if not the greatest, a most decisive influence in the economic developments . . . knowing that you cooperate with students, I wonder if it is possible for me to receive a copy of the study "Puerto Rico's New Look" together with other data you think might be useful to me?" New York.

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acres per capita. That increase, in terms of a population of 150 million, is equivalent to a total increase of 21 million acres, an area nearly as large as the State of Indiana. The shift towards fruits and vegetables does not increase the total land requirement, but it does increase the demand for irrigated land.[24]

Since 1910, the total land acreage used for human consumption has risen by less than half but population has increased by more than two-thirds. Cropland acreage used to produce food, fiber and tobacco for domestic consumption stood at 2.14 per capita between 1910-1914, dropped to 2.05 between 1920-24, rose to 2.26 in 1930 and remained near there until 1944, and then dropped sharply to 2.06 during the next five years.[25]

Dr. Byron T. Shaw, Administrator of the Department of Agriculture's Agricultural Research Administration has said that "it takes about 3 acres of cropland equivalent to provide food and fibre for one person." He believes that agriculture faces a tremendous job in the next 25 years to keep pace with our growing population. While Dr. Shaw sees no prospect that Americans will really go hungry, he is concerned about maintaining —and improving if possible—our present dietary levels for 190 million people by 1975:

> In the past we have helped meet the needs of our growing population by bringing new land into cultivation. . . . By about 1920, however, most of the new lands had been taken. Since that time, a large share of our additional cropland has come into food production because of its release from growing feed for horses and mules. There have also been some small additions from irrigation and land clearing. Between 1935 and 1950 we were able to add a net of 38 million acres of cropland equivalent for the production of food and fiber for domestic human consumption.
>
> Because such a large portion of our food supplies comes through the route of livestock, it is not enough just to consider cropland by itself. We must take into account grazing land and pastures in addition. So when I speak of the number of acres available or needed for food production, I mean our present cropland plus the cropland equivalent of acreages that are now or may be used for livestock feed.
>
> The application of science and technology also gave us a big increase in production between 1935 and 1950. Improvements on the farm through science gave us food and fiber equivalent to the products from 64 million acres of land.
>
> All told, then, we increased our food production by the equivalent of 102 million acres between 1935 and 1950. That was enough to provide not only for the increase in population that took place during that time but also for the improvements in diet that we enjoy today.

Looking ahead to 1975, Dr. Shaw estimates that we will be short some 70 million acres needed to feed 190 million people:

> . . . Instead of 38 million acres released from producing feed for horses and mules that we got during the last 15 years, we can expect only about 15 million acres of land for food production from this source by 1975 . . . we may bring an additional 30 million acres into full production by irrigation, drainage, clearing, and flood control. These two items could give us 45 million acres of the 115 million that we are going to need . . . it looks as if we will be short somewhere in the neighborhood of 70 million acres in 1975.

How do we make up the deficit? Dr. Shaw dismissed the idea of

"import more and export fewer agricultural products" as not practical when considering world conditions. He believes that better use of land offers the best opportunity. He acknowledges great strides in this direction but believes we are not going fast enough and he wonders if a point of diminishing return may not be reached in our continuous effort to increase yields:

A simple way to size up the job and compare it with what we have done in the past is to look at it on a year to-year basis. Science and technology currently are giving us the equivalent of about 5 million acres of cropland each year. But that is not enough. It takes about 3 acres of cropland equivalent to provide food and fiber for one person. Since we are growing at the rate of 2½ million people a year, we need to add the equivalent of 7½ million acres of cropland each year instead of 5 million.

In looking at the gains in the last 15 years, we should remember that they included hybrid corn, nearly three times as much fertilizer used, DDT and other new insecticides, new disease-resistant crop varieties, and more soil conservation. Another fact we must take into consideration is that as efficiency approaches high levels, it becomes increasingly difficult to raise these levels still higher. It will be difficult, for example, to increase corn yields again as much as they were increased by the development of hybrid corn.

To get the increased production needed in 1975, we will have to eliminate many of the ravages of insects and diseases and develop still better crop varieties and livestock breeds. We are losing 10 percent of all farm animals from diseases and parasites. Brucellosis alone is cutting our milk supply by a billion pounds a year. Insects still cost U. S. farmers 4 billion dollars worth of crops and livestock every year, and plant diseases threaten several of our major crops.

. . . Of course some land is being improved, but on the whole we are going down hill. In the large area of highly productive soils in the Midwest, it has been estimated that the inherent productivity of these soils is still going down hill at the rate of 7/10 of 1 percent a year. In the State of Iowa the rate is 1 percent a year.

So far, we have nowhere near realized the full potential from fertilizer use. . . . Usually the opportunities are greatest [for increasing crop yields] when fertilizer is used in adequate quantities in combination with several other improved practices.

. . . Most of the studies that have been made on agriculture's maximum production capacity are based on an ideal situation. That is, they assume the application of the best known combinations of practices for each farm and for each crop, and that every farmer would give top-level management to each acre of his land. Obviously, we will never realize this ideal. We will probably never be able to completely close the gap, but we do need to do everything possible to narrow it. How well we succeed will have a vital bearing on our capacity to produce food.[26]

In the total context this cannot be taken to mean that indefinite production is possible to feed the people of this and other nations. Once the decline in productivity of corn belt and other soils is checked, once brucellosis and other diseases have been controlled and pests eliminated, the build-up of increasing production will be a slow, tedious job.

While these complicated steps are being taken, there is every prospect that the population of the United States and of the world will continue to increase. A point of stabilization is not yet in sight.

Nor is the problem of resources limited to food alone.

DRAIN ON FORESTS IS CRITICAL

The Materials Policy Commission cites forest products as a classic example of how depletion leads to higher costs and changes in resource use, even though consumption of timber was less in 1950 than in 1900:

> Wood is one of the Nation's basic industrial materials. Despite increasing use of many competing materials, lumber remains indispensable in building construction, shipbuilding, furniture manufacture, and dozens of other enterprises. Nearly all paper and paperboard comes from woodpulp, and much of the fuel supply of rural areas comes from the woodlot. In 1950, the total value of the timber cut, as it stood in the forest, was about 1 billion dollars. Production of timber-based industries turning out lumber and other wood products, paper and allied products, and furniture, totaled about 15 billion dollars.
>
> Timber used to be even more important in the national economy. Total consumption of forest products was actually somewhat smaller in 1950 than in 1900, although during that period domestic consumption of farm products more than doubled and consumption of minerals reached six times the 1900 level. Part of the decline of timber was inevitable. The continued development of domestic metals industries and the general advance in technology have greatly reduced the country's early heavy dependence on timber as a raw material, only partly counteracted by such mounting demand as that for woodpulp to make paper products. Another reason for smaller use of timber has been dwindling domestic supplies, Most of the country's virgin timber has been felled. New growth on the cutover areas is running far behind the annual cut of saw timber. The consequent higher costs, reflecting both market scarcity and costs of replacement, have edged timber out of uses to which it is well adapted; and exhaustible materials have taken the place of renewable timber because they are cheaper. And the United States has moved from export to import basis.[27]

It takes 50 to 60 years to grow a tree suitable for lumber. In 1945, annual growth of timber was estimated at about 13.4 billion cubic feet, including 3 billion cubic feet of saw timber.*

In 1950, a total 16.5 billion cubic feet of all sizes of timber were cut including 4.4 billion cubic feet of saw timber. This saw timber drain totaled 50 percent more than current annual growth. An additional 1.3 billion cubic feet was imported for use as pulpwood, woodpulp, paper, and lumber.

Future requirements for timber products show a prospective increased consumption by 1975 of approximately 21 per cent above 1950.

To meet the increased demand of 1975, annual growth of all timber must be increased by about 34 percent, and growth of saw timber should double that of 1945.

United States forests still contain an estimated 133 billion cubic feet of saw timber and about 470 billion cubic feet of all timber. Southeastern Alaska has, in addition, about five million acres of commercial forest lands with at least seven billion cubic feet of board timber.[28]

In more recent years of high prices, enlightened self-interest has brought better management practices to many of the large private forestry operations. Unfortunately this trend has not yet extended to the small operators.

*For the lay reader, all timber figures are reduced to cubic feet. Approximately 12 board feet equal one cubic foot.

According to the U. S. Forest Service, only 25 percent of all commercial forest land is publicly owned; 75 percent is privately owned: 57 percent in small holdings, seven per cent in medium-sized holdings, and 11 percent is in the hands of large operators, mainly lumber and pulp manufacturers. Thus the improved forest practice of some of the large operators still leaves a great deal of forest land subject to mismanagement. This is hardly building toward a sustained yield forestry program.

A survey made in 1945 on cutting practices by the U. S. Forest Service emphasizes this point:

> Judged by current cutting practice, which is our best criterion of landowner attitude toward forestry, the small holdings stand out as the crux of the problem of increasing our timber growth. . . .
>
> The survey brings out that cutting practices are in general better on public lands than on private. Two-thirds of all cutting on public lands is good or high order, whereas almost two-thirds of the cutting on private lands is poor or destructive.
>
> Within the private ownership there is a significant difference between small owners and large. Almost one-third of the cutting by large owners is good or high order and only one-third is poor or destructive. Large owners show up so well primarily because of their progress in the South. More than half of the large owner cutting in the South is good or better, while in both North and West less than one-tenth is of this order.
>
> Sixty-one percent of the cutting by medium-size owners and 71 percent of that by small owners is poor or destructive. Only 4 percent of the small owner cutting is good or better. Here then is where we have made least progress in our forestry effort.[29]

Unless vigorous action is taken to improve cutting and all other management practices in our forests, the nation will encounter a serious shortage of wood products in the next few years or be forced to mine its standing timber to an extent that will create an even more critical shortage later.

NEEDED: A NATIONAL RESOURCE-CONSERVATION ETHIC

The question which should be coursing through the mind of every citizen is: How long can the United States continue to live on its capital and that of the planet?

The per capita capacity to consume materials will increase as—and *if*—levels of living rise and as undeveloped areas move through the stages of industrialization. The more perfect the process the greater the drain on the capital resources not only of this country but of the world.

The whole resource management problem is one of the most critical problems facing our nation. To let default or apathy erode our national heritage is to commit a crime against future generations.

ROBERT C. COOK, *Editor*

ERRATUM for April 1953 *Population Bulletin*

Page 18, 2nd paragraph, dealing with the decline of the birth rate in Japan, states: "Since 1947, the decline amounts to a drop of 11.3 points, a five-year decline unprecedented in the annals of vital statistics anywhere in the world." This should read "Since 1947, the decline amounts to a drop of *10.7* points, a *six*-year decline unprecedented . . .". The Editor regrets this mistake, which was due to the receipt at the last moment of the latest 1952 estimates.

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